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EXAMINER	
FUJITA, KATRINA R	
ART UNIT	PAPER NUMBER
2624	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/521,254	KAUS ET AL.	
	Examiner	Art Unit	
	KATRINA FUJITA	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 October 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 8-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 8-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to Applicant's remarks received on October 07, 2009. Claims 1-4, 8, 9 and newly added 10-14 remain pending.

2. The Examiner notes at claim 8, line 3, the text "which stores" was not part in the previous iteration of the claim 8, but rather appears it was added by amendment without being underlined. Therefore, the Examiner will assume the Applicant intended to underline "which stores".

Claim Objections

3. The following is a quotation of 37 CFR 1.75(a):

> The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

4. Claims 1, 8-10 and 12 are objected to under 37 CFR 1.75(a), as failing to particularly point out and distinctly claim the subject matter which application regards as his invention or discovery.

Claim 1 recites "geometrical properties" at line 7. It is unclear whether this is intended to be the same as or different from the "geometrical properties" at line 2. The

following will be assumed for examination purposes: -- extracting the geometrical properties --. The same applies to claim 8, line 11, claim 9, line 9 and claim 10, line 7.

In claim 12, line 3, "indentifying elements" should be -- identifying ~~indentifying~~ elements --.

In claim 12, line 6, "the fist sub-part" should be -- the first ~~fist~~ sub-part --.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 13 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 13 requires the first and second primitives to be "first and second spheres" at line 2 and the geometric property to be a "distance between the centers of the first and second spheres". However, the specification at page 10, lines 17-27 only describes a single sphere to be used as a primitive for approximation of the femur head. There is no description of a second sphere, nor is there a description of the geometric property being the distance between 2 spheres.

Therefore, the specification does not provide clear, adequate support for a second sphere and a distance between the first and second sphere.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-4, 8-12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Wu ("Computing parametric geon descriptions of 3d multi-part objects", Thesis) and Holten-Lund et al. ("VRML Visualization…", ACM Article).

Regarding **claim 1**, Wu discloses a method for determining geometrical properties of a structure of an object displayed in an image ("three-dimensional (3D) shape representation of objects based on parts" at page 1, last paragraph, line 1) comprising the steps of:

adapting a deformable surface model to the object ("sphere is deformed towards the shape of the object and residuals between the model and data points are computed" at page 56, line 10; figure 4.9);

applying additional geometrical information to the adapted deformable surface model of the object (“parametric geon models are fitted to an object part" at page 61, line 8).

Wu does not disclose extracting the geometric properties of the structure of the object from the adapted deformable surface model to which additional geometrical information has been applied.

Holten-Lund et al. teaches a method for determining geometrical properties of a structure of an object displayed in an image (“make the necessary measurements of the deformation” at section 1, paragraph 4, line 1), comprising:

extracting the geometric properties of the structure of the object (“measure the topology” at section 3, paragraph 2, line 5; figure 9, “Furthermore results of a measurement are shown” at window labeled “Angle-ent6”) from the adapted deformable surface model (“iso-surface” at section 3, paragraph 2, line 1, which is generated from VRML, implying that it is deformable by changing the specifications of the model parameters, i.e. vertices, edges, texture, etc.) to which additional geometrical information has been applied (“approximate primitives" at section 3, paragraph 2, line 4; figure 9, spherical primitive).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the measurements of Holten-Lund et al. on the adapted models of Wu such that further understanding of object parts may be obtained by providing a quantification of the data, in addition to allowing the Wu method to have a particular

applicability to the field of medical imaging (see Holten-Lund et al. at section 1, paragraphs 3 and 4).

Regarding **claim 8**, Wu discloses an image processing device ("SPARC-10 or SGI R4000 or R8000 workstations" at page 81, line 7), comprising:

a memory (memory of workstation) which stores a deformable model (figure 4.9) and an image depicting an object (figure 4.7); and

an image processor (processor of workstation) which determines geometrical properties of the object ("three-dimensional (3D) shape representation of objects based on parts" at page 1, last paragraph, line 1), wherein the processor is programmed to perform the following operation:

adapting a deformable surface model to the object ("sphere is deformed towards the shape of the object and residuals between the model and data points are computed" at page 56, line 10; figure 4.9);

applying additional geometrical information to the adapted deformable surface model of the object ("parametric geon models are fitted to an object part" at page 61, line 8).

Wu does not disclose extracting the geometric properties of the structure of the object from the adapted deformable surface model to which additional geometrical information has been applied.

Holten-Lund et al. teaches an image processing device, comprising:

a processor (processor of PC, implied by section 3.2) for determining geometrical properties of the object ("make the necessary measurements of the deformation" at section 1, paragraph 4, line 1), which processor performs the following:

extracting the geometric properties of the structure of the object ("measure the topology" at section 3, paragraph 2, line 5; figure 9, "Furthermore results of a measurement are shown" at window labeled "Angle-ent6") from the adapted deformable surface model ("iso-surface" at section 3, paragraph 2, line 1, which is generated from VRML, implying that it is deformable by changing the specifications of the model parameters, i.e. vertices, edges, texture, etc.) to which additional geometrical information has been applied ("approximate primitives" at section 3, paragraph 2, line 4; figure 9, spherical primitive).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the measurements of Holten-Lund et al. on the adapted models of Wu such that further understanding of object parts may be obtained by providing a quantification of the data, in addition to allowing the Wu method to have a particular applicability to the field of medical imaging (see Holten-Lund et al. at section 1, paragraphs 3 and 4).

Regarding **claim 2**, Wu discloses a method wherein the step of applying additional geometrical information to the adapted deformable surface model of the object further comprises the steps of:

identifying surface elements of the deformable surface model relating to a particular sub-part of the object ("triangles belonging to the same physical part are obtained by a connected component labelling process" at page 42, line 12); and

fitting a geometrical primitive to the surface elements relating to the particular sub-part of the object in the deformable surface model, the geometrical primitive having a form corresponding to a form of the particular sub-part ("All parametric geon models are fitted to an object part by minimising a function of the difference between the shape and size of a part and the models" at page 61, line 9; figure 6.25).

Regarding **claim 3**, Holten-Lund et al. discloses a method wherein the geometrical properties of the object are extracted on the basis of the geometrical primitive ("To make the necessary measurements of the deformation we chose to approximate relevant parts of the femur-pelvis area with simple 3D primitives" at section 1, paragraph 4, line 1).

Regarding **claim 4**, Wu discloses a method wherein the surface elements of the particular sub-part of the object are identified by means of labels assigned to the surface elements belonging to the particular sub-part ("triangles belonging to the same physical part are obtained by a connected component labelling process" at page 42, line 12).

Regarding **claim 9**, the Wu and Holten-Lund et al. combination a computer-readable medium having processor-executable instructions thereon ("All programs were written in C or C++ and were run on SPARC-10 or SGI R4000 or R8000 workstations"

Wu at page 81, line 7) for execution by a processor of the image processing device above to control the processor to perform the method of claim 1 as described above.

Regarding **claim 10**, Wu discloses a method for determining geometric properties of a subpart of an object ("finite element model in the form of a closed triangular mesh is created over the object surface" at page 42, line 7), comprising:

with a processor (processor of "SPARC-10 or SGI R4000 or R8000 workstations" at page 81, line 7), applying an extended deformable model represented by a polygon mesh to a surface of an object of interest from an image ("sphere is deformed towards the shape of the object and residuals between the model and data points are computed" at page 56, line 10; figure 4.9);

with the processor, fitting the deformable model to optimally fit a surface of at least one sub-part of the surface of the object of interest ("parametric geon models are fitted to an object part by minimising a function of the different between the shape and size of a part and the models; the best model for that part is selected" at page 61, line 8).

Wu does not disclose determining geometrical properties of the object of interest based on the deformable model fit to the sub-part.

Holten-Lund et al. teaches a method for determining geometric properties of a subpart of an object ("make the necessary measurements of the deformation" at section 1, paragraph 4, line 1), comprising:

with the processor (processor of PC, implied by section 3.2), determining geometrical properties of the object of interest ("measure the topology" at section 3,

paragraph 2, line 5; figure 9, "Furthermore results of a measurement are shown" at window labeled "Angle-ent6") based on the deformable model fit to the sub-part ("iso-surface" at section 3, paragraph 2, line 1, which is generated from VRML, implying that it is deformable by changing the specifications of the model parameters, i.e. vertices, edges, texture, etc.).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the measurements of Holten-Lund et al. on the adapted models of Wu such that further understanding of object parts may be obtained by providing a quantification of the data, in addition to allowing the Wu method to have a particular applicability to the field of medical imaging (see Holten-Lund et al. at section 1, paragraphs 3 and 4).

Regarding **claim 11**, the Wu and Holten-Lund et al. combination discloses a method further including:

labeling elements of the polygon mesh corresponding to the at least one sub-part of interest ("triangles belonging to the same physical part are obtained by a connected component labelling process" Wu at page 42, line 12); and

fitting a geometric primitive to the labeled elements of the polygon mesh corresponding to each of the at least one sub-part of interest ("All parametric geon models are fitted to an object part" Wu at page 61, line 8; "best model for that part is selected" Wu at page 61, line 9); and

wherein the geometric properties of the object are determined based on the geometric primitive ("To make the necessary measurements of the deformation we

chose to approximate relevant parts of the femur-pelvis area with simple 3D primitives" Holten-Lund et al. at section 1, paragraph 4, line 1).

Regarding **claim 12**, the Wu and Holten-Lund et al. combination discloses a method wherein the deformable model is fit to at least first and second sub-parts of the object and further including:

identifying elements of the polygon mesh fit to the first sub-part ("triangles belonging to the same physical part are obtained by a connected component labelling process" Wu at page 42, line 12 corresponding to the part defined by the cylinder in figure 6.25b);

identifying elements of the polygon mesh fit to the second sub-part ("triangles belonging to the same physical part are obtained by a connected component labelling process" Wu at page 42, line 12 corresponding to the part defined by the sphere in figure 6.25b);

fitting a first geometric primitive to the elements of the polygon mesh fit to the first sub-part ("All parametric geon models are fitted to an object part by minimising a function of the difference between the shape and size of a part and the models" Wu at page 61, line 9; cylinder in figure 6.25b);

fitting a second geometric primitive to the elements of the polygon mesh fit to the second sub-part ("All parametric geon models are fitted to an object part by minimising a function of the difference between the shape and size of a part and the models" Wu at page 61, line 9; sphere in figure 6.25b); and

determining the geometric properties of the object using properties of the first and second geometric primitives ("measure the topology" Holten-Lund at section 3, paragraph 2, line 5; figure 9, "Furthermore results of a measurement are shown" at window labeled "Angle-ent6"; "iso-surface" at section 3, paragraph 2, line 1, which is generated from VRML, implying that it is deformable by changing the specifications of the model parameters, i.e. vertices, edges, texture, etc.; as each part is labeled, each can be measured utilizing the method of Holten-Lund on each part).

Regarding **claim 14**, Wu discloses a method wherein the step of fitting the deformable model to optimally fit the surface of the sub-part of the object, further includes:

identifying a plurality of surface points of the surface of the sub-part of the object ("triangles belonging to the same physical part are obtained by a connected component labelling process" at page 42, line 12); and

altering the polygon mesh to fit vertices of the polygons mesh to the identified surface points ("All parametric geon models are fitted to an object part by minimising a function of the difference between the shape and size of a part and the models" at page 61, line 9; figure 6.25).

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KATRINA FUJITA whose telephone number is (571)270-1574. The examiner can normally be reached on M-Th 8-5:30pm, F 8-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Katrina Fujita/
Examiner, Art Unit 2624

/VIKKRAM BALI/
Supervisory Patent Examiner, Art Unit 2624